

AVEVA PI WORLD

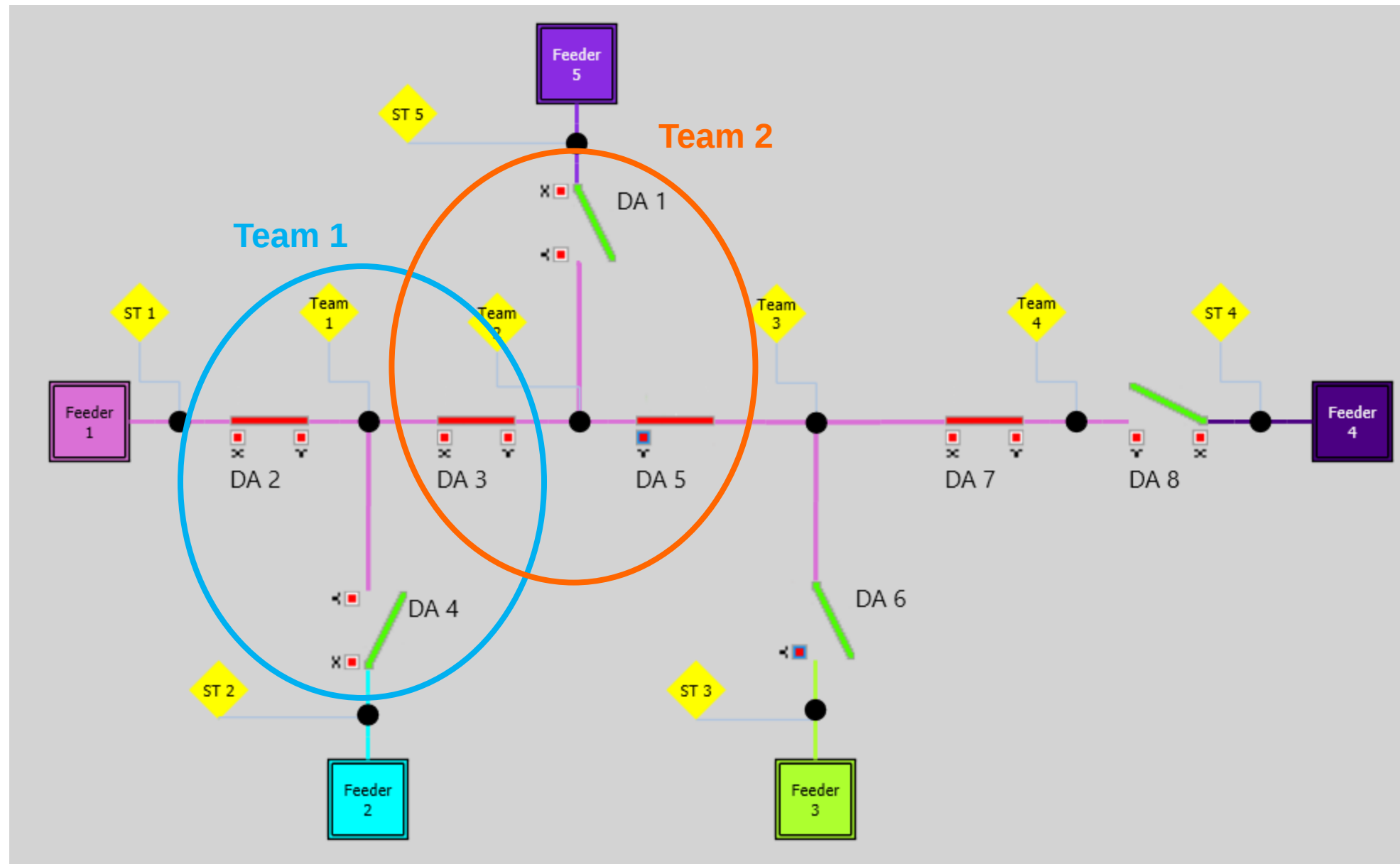
Distribution Automation Exception Analysis PI and PowerRunner

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with support from Thomas Alford and Teresa Duran Carretero

AVEVA

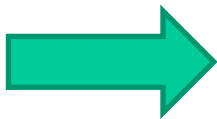
- Main Use Case – DA Teaming
- DA Team Scheme and alarms
- Current Process
- Sequence Auto Learn – Machine Learning
- Design and Dataflow
- Future Use Cases



- Static Report produced daily with all alarms
 - Tabular Form
- Point-in-Time DA Team alarm status
- All alarms need to be vetted
 - No Team relation and requires familiarity
- 2 DA Engineers Monitoring team statuses

Static Report

REGION	SUBNAM	PNTNAM	CSTEXT
REGION 1	X LINE	DA1 TEMNTR TGT	ALARM
REGION 1	X LINE	DA2 TEMNTR TGT	ALARM
REGION 1	X LINE	DA3 TEMNTR TGT	ALARM
REGION 1	X LINE	DA4 TEMNTR TGT	ALARM
REGION 1	X LINE	DA5 TEMNTR TGT	ALARM
REGION 1	Y LINE	DA6 TEMNTR TGT	ALARM
REGION 1	Y LINE	DA7 TEMNTR TGT	ALARM
REGION 1	Y LINE	DA8 TEMNTR TGT	ALARM
REGION 1	Y LINE	DA9 TEMNTR TGT	ALARM
REGION 1	Y LINE	DA10 TEMNTR TGT	ALARM
REGION 1	Z LINE	DA11 TEMNTR TGT	ALARM
REGION 1	Z LINE	DA12 TEMNTR TGT	ALARM
REGION 1	Z LINE	DA13 TEMNTR TGT	ALARM
REGION 1	Z LINE	DA14 TEMNTR TGT	ALARM
REGION 1	Z LINE	DA15 TEMNTR TGT	ALARM
REGION 1	Z LINE	DA16 TEMNTR TGT	ALARM
REGION 1	Z LINE	DA17 TEMNTR TGT	ALARM
REGION 1	Z LINE	DA18 TEMNTR TGT	ALARM



Exception Based – Smart Alarms

Current Teaming Status ✕

Data up to Version: 762

Team	Event Time	Team Status	Review Status
▶ [redacted]	11/12/2020 10:50	REVIEW REQUIRED	
▶ [redacted]	11/12/2020 10:50	REVIEW REQUIRED	
▶ [redacted]	11/12/2020 10:55	REVIEW REQUIRED	
▶ [redacted]	11/12/2020 10:50	REVIEW REQUIRED	
▶ [redacted]	11/12/2020 10:55	REVIEW REQUIRED	
▶ [redacted]	11/12/2020 12:55	Out of Telemetry	
▶ [redacted]	11/12/2020 10:45	COMPLETE NO ALARM	
▶ [redacted]	11/12/2020 10:50	COMPLETE NO ALARM	
▶ [redacted]	11/12/2020 10:55	COMPLETE NO ALARM	
▶ [redacted]	11/12/2020 11:05	COMPLETE NO ALARM	
▶ [redacted]	11/12/2020 10:50	COMPLETE NO ALARM	
▶ [redacted]	11/12/2020 12:35	COMPLETE NO ALARM	
▶ [redacted]	11/12/2020 10:55	COMPLETE NO ALARM	
▶ [redacted]	11/12/2020 10:50	COMPLETE NO ALARM	
▶ [redacted]	11/12/2020 10:50	COMPLETE NO ALARM	
▶ [redacted]	11/12/2020 10:50	COMPLETE NO ALARM	
▶ [redacted]	11/12/2020 10:55	COMPLETE NO ALARM	
▶ [redacted]	11/12/2020 10:55	COMPLETE NO ALARM	
▶ [redacted]	11/12/2020 10:55	COMPLETE NO ALARM	
▶ [redacted]	11/12/2020 10:50	COMPLETE NO ALARM	
▶ [redacted]	11/12/2020 10:55	COMPLETE NO ALARM	
▶ [redacted]	11/12/2020 11:55	COMPLETE NO ALARM	
▶ [redacted]	11/12/2020 10:55	COMPLETE NO ALARM	
▶ [redacted]	11/12/2020 10:55	COMPLETE NO ALARM	

60 Team

Teaming Alarm Dashboard

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Current Teaming Status ✕

Data up to Version: 762

Team	Event Time	Team Status	Review Status			
11/12/2020 10:50	11/12/2020 10:50	REVIEW REQUIRED				
11/12/2020 10:50	11/12/2020 10:50	REVIEW REQUIRED				
11/12/2020 10:55	11/12/2020 10:55	REVIEW REQUIRED				
11/12/2020 10:50	11/12/2020 10:50	REVIEW REQUIRED				
11/12/2020 10:55	11/12/2020 10:55	REVIEW REQUIRED				
Device Team Status			Complete Review			
Device	Feeder	Bus	Event Type	Event	Event Time	Device Status
11/12/2020 10:57	11/12/2020 10:57	EMC	TEMNTRTGT	TEMNTRTGT ALARM-METER	11/12/2020 10:57	REVIEW REQUIRED
11/12/2020 10:57	11/12/2020 10:57	EMC	VS	VS OPEN-METER	11/12/2020 10:57	REVIEW REQUIRED
11/12/2020 10:57	11/12/2020 10:57	EMC	MANOPRTGT	MANOPRTGT NORMAL-METER	11/12/2020 10:57	REVIEW REQUIRED
11/12/2020 10:57	11/12/2020 10:57	EMC	ITRESTSTAT	ITRESTSTAT ON-METER	11/12/2020 10:57	REVIEW REQUIRED
11/12/2020 10:57	11/12/2020 10:57	EMC	NOTTACSTAT	NOTTACSTAT OFF-METER	11/12/2020 10:57	REVIEW REQUIRED
11/12/2020 12:55	11/12/2020 12:55		Out of Telemetry			
11/12/2020 10:45	11/12/2020 10:45		COMPLETE NO ALARM			
11/12/2020 10:50	11/12/2020 10:50		COMPLETE NO ALARM			
11/12/2020 10:55	11/12/2020 10:55		COMPLETE NO ALARM			
11/12/2020 11:05	11/12/2020 11:05		COMPLETE NO ALARM			
11/12/2020 10:50	11/12/2020 10:50		COMPLETE NO ALARM			
11/12/2020 12:35	11/12/2020 12:35		COMPLETE NO ALARM			
11/12/2020 10:55	11/12/2020 10:55		COMPLETE NO ALARM			
11/12/2020 10:50	11/12/2020 10:50		COMPLETE NO ALARM			
60 Team						

Status Pt	Value 1	Value 2	Value 3
T= Team	NORMAL	ALARM	F*
V = SW Pos	OPEN	CLOSED	F*
M = ManOp	NORMAL	ALARM	F*
I = Restoration	ON	OFF	F*
H = Hot Line Tag	ON	OFF	F*

- 5 Status Points
- Anchor on Team Status Point
- Bookend 5 Minute
- **> 360 different combinations and growing**

Attribute Values

Attribute Groups

Attribute Groups

Group Name	Unmatched Values Set Name
REVIEW	REVIEW REQUIRED

Group Sets

Available Attribute Values

Value

NONE

T=A-M

V=OP-M M=N-M I=ON-M H=OFF-M

T=A V=OP M=N I=ON H=OFF

T=A-M,F*A-M V=F*OP-M M=F*N-M I=F*ON-M H=F*OFF-M

T=A-M V=OP-M M=N-M I=ON-M H=OFF-M

T=A-M,F*A-M V=CL-M,F*CL-M M=F*N-M,N-M I=F*ON-M,ON-M H=F*OFF-M,OFF-M

Attribute Values

Attribute Groups

Attribute Groups

Add New

Edit List

Group Name	Unmatched Values Set Name
REVIEW	REVIEW REQUIRED

Group Sets

Edit

Value Set

Set Name : COMPLETE

Attribute Values

T=A-M H=ON-M

Value Set

Set Name : Alarm Reset

Attribute Values

T=A-M,N-M

Value Set

Set Name : Out of Telemetry

Attribute Values

T=F*N-M M=F*N-M
T=F*N-M,N-M M=F*N-M,N-M
T=F*N-M V=F*OP-M M=F*N-M I=F*...
T=F*N-M,N-M V=F*OP-M,OP-M M=...

Value Set

Set Name : REVIEW COMPLETE IF CLOSED

Attribute Values

T=A V=OP M=A I=ON H=OFF

Value Set

Set Name : COMPLETE NO ALARM

Attribute Values

T=N-M M=N-M
T=N V=OP M=N I=ON H=OFF
T=N-M M=N-M I=ON-M
T=N-M

Value Set

Set Name : REVIEW COMPLETE IF OPEN

Attribute Values

T=A-M I=OFF-M

Value Set

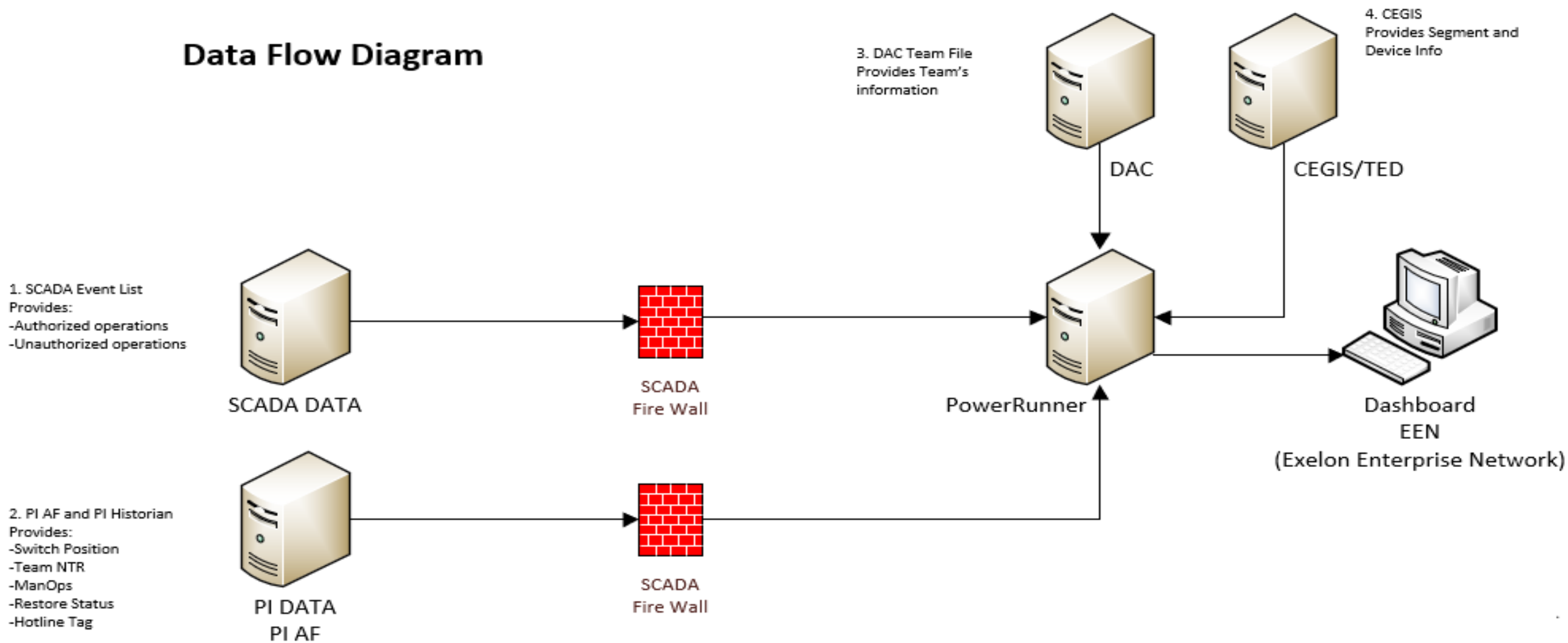
Set Name : Manual Operations

Attribute Values

T=A-M V=OP-M M=A-M
T=A-M,N-M V=OP-M M=A-M,N-M
T=A-M,N-M V=CL-M M=A-M,N-M

Status Pt	Value 1	Value 2	Value 3
T= Team	NORMAL	ALARM	F*
V = SW Pos	OPEN	CLOSED	F*
M = ManOp	NORMAL	ALARM	F*
I = Restoration	ON	OFF	F*
H = Hot Line Tag	ON	OFF	F*

Data Flow Diagram



- Benefits:
 - Reduce review time for DA engineers: In March 2021, only 4% of the alarms reviewed needed DA troubleshooting
 - It can be use for other applications besides teaming
 - It is real time analysis, instead of a point in time report
- Other use cases
 - DA Operations review
 - Connectivity Model
 - Conductor Slap
 - DA Health
 - DA System Dashboard Integration



Challenge

How to monitor DA Team status in a one-to-many group of DA assets

Variable DA asset team size

Team Smart Alarming with 5 digital states

Maintain one-to-many relationship's



Solution

Provide exception Based Smart Alarming in near real time and display teams "not ready" with alarm conditions

Retrieve operational states and perform analytics in near real time from hundreds of DA Teams

Automate Team configuration



Benefits

Provided visualization of team member status in near real time

Maintain Automate Team configuration

Reduced alarms required for review by ~70%

DA Team Status is available to DA support group in near real-time



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THANKYOU

謝謝

DZIĘKUJĘ CI

NGIYABONGA

TEŞEKKÜR EDERİM

DANKIE

TERIMA KASIH

GRACIES

WHAKAWHETAI KOE

DANKON

TANK

TAPADH LEAT

SALAMAT

SPASIBO

GRAZIE

MATUR NUWUN

ХВАЛА ВАМ

MULTUMESC

PAKMET CI3GE

고맙습니다

GRAZIE

شكرا

FAAFETAI

ESKERRIK ASKO

HVALA

GO RAIBH MAITH AGAT

БЛАГОДАРЯ

GRACIAS

ТИ БЛАГОДАРАМ

MAHADSANID

TEŞEKKÜR EDERİM

OBRIGADO

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DANKJE

EΥΧΑΡΙΣΤΩ

GRATIAS TIBI

MAHALO IĀ 'OE

TAKK SKAL DU HA

RAHMAT

MERCI

GRAZZI

PAKKA PÉR

HATUR NUHUN

PAXMAT CAҒA

FALEMINDERIT

ありがとうございました

DI OU MÈSI

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SIPAS JI WERE

TERIMA KASIH

UA TSAUG RAU KOJ

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WAZVIITA

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